INEEL Large-Scale Demonstration Project

Test Plan for the Demonstration of the Niton Lead Paint Analyzer

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1.0 Introduction

This field demonstration of the Lead Paint Analyzer (LPA) is part of a larger series of demonstrations executed under the Large Scale Demonstration and Deployment Project (LSDDP) funded by the Department of Energy (DOE) Environmental Management (EM)-50. The primary purpose of the LSDDP is to demonstrate innovative technologies on a large scale basis in conjunction with Decommissioning and Dismantlement (D&D) activities. The innovative technologies demonstrated are compared against DOE's baselines and/or industrial baseline technologies in the relevant areas.

The first objective of the LSDDP is to identify existing technologies unproven in D&D applications that address the defined problems or needs of DOE D&D activities. The second objective is to quantify and document the benefits, if any, that can be realized from a side by side comparison of the innovative and baseline technologies. Possible benefits include cost reduction, exposure reduction, safety increase, and application ease. This direct comparison provides an opportunity to assess the impact of the innovative technology against the baseline and validate the benefits to be gained.

This demonstration, a field-screening scenario, will provide quantifiable data regarding lead concentrations contained in the paint on the walls, floors, and ceilings within rooms at the Initial Engine Test (IET), Test Reactor Area (TRA), and Idaho Nuclear Technology and Engineering Center (INTEC) facilities. The proposed LPA technology will offer a reduction in laboratory costs if the number of samples requiring laboratory analyses can be decreased. This will require the regulatory stake holders (e.g., EPA) agreement to fewer confirmatory samples due to the accuracy of the LPA. The baseline technology is to conduct a time consuming analysis on numerous samples in the laboratory. Due to the reduction in required laboratory time, the LPA technology could significantly shorten the time it takes to perform D&D activities in lead paint or non-lead paint areas resulting in a shorter D&D schedule, lower costs, and fewer worker hours.

1.1 Purpose

The purpose of this field demonstration is to assess the effectiveness of the LPA in detecting and providing the quantitative measurement of lead, cadmium, and chromium on painted walls, floors, and ceilings within rooms at IET, TRA, and INTEC facilities. These are only a few elements from the full range of elements the Niton LPA is capable of analyzing. The elements the Niton LPA is capable of detecting while using a cadmium-109 source are: arsenic, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, rubidium, selenium, strontium, titanium, zinc, and zirconium. The elements the Niton LPA is capable of detecting while using an americium-241 source are: antimony, barium, cadmium, indium, iodine, palladium, silver, and tin.

The Niton vendor will operate the Niton equipment. Sale and training of the Niton instrument will be provided to the INEEL if requested.

1.2 Scope

Part of the demonstration will be performed at the IET facility at the INEEL. The IET facility consists of several buildings and structures both above and below ground level. The main building at the facility is a dirt-covered control and equipment building, which is constructed of high-density reinforced concrete. The facility also includes numerous waste and fuel storage tanks, a coupling station (reactor test pad), exhaust duct and stack, a monitoring vault, and a liquid radioactive hot-waste transfer line, approximately a mile long, connecting IET to TAN.

The other parts of the demonstration will be performed at TRA and INTEC facilities. TRA consists of 88 buildings and 70 structures. These facilities include reactors, laboratories, offices, training facilities, and craft support for maintenance facilities. INTEC's focus is on receiving/storing spent nuclear fuels and radioactive wastes, treating/converting wastes, and developing new technologies for waste and waste management.

Organizational Structure and Key Personnel

The DOE is supporting the demonstration of this technology. The Technology Development Department (TDD) has the primary responsibility for implementing the field demonstration. Table 1. below lists key personnel, including primary and secondary alternates, associated with the execution of this field demonstration.

Table 1. Key Project Personnel

Project Specific Title	Name	Phone Number	E mail
Project Manager	Dick Meservey	(208) 526-1834	Rhm@inel.gov
Mechanical Engineer	Larry Whitmill	(208) 526-0357	Wit@inel.gov
D&D Manager	Glen Rodman	(208) 533-4314	Grr@inel.gov
Facility Manager	Harold Thorne	(208) 526-8078	Hlt@inel.gov
Test Engineer	Vince Daniel	(208) 526-5738	Ved@inel.gov
Data Collector	Neal Yancey	(208) 526-5157	Yancna@inel.gov
Industrial Hygienist	Saul Chessin	(208) 533-4152	Schessin@inel.gov
RCT	Brian Grant	(208) 533-4131	Bg2@inel.gov
Planner	Robert Tyng	(208) 526-2508	Tyn@inel.gov
Test Engineer Alternative	Neal Yancey	(208) 526-5157	Yancna@inel.gov

2.0 Field Analysis Program

The field analysis phase of this project will follow the evaluation of the baseline activity. This analysis will not impact the overall D&D schedule being conducted by the INEEL.

2.1 Baseline Technology

When workers remove or repair paint on a building, an analysis of the removed paint for possible traces of lead and/or cadmium is required in order to properly dispose of the waste. To establish a baseline for comparison, samples were taken from the different facilities and sent to an INEEL contracted laboratory for analyses of lead, cadmium and chromium in the paint.

2.2 LPA Operation

The Niton LPA stores the two sealed radioactive cadmium-109 and americium-241 sources inside the instrument. Either source can be used during operations simply by flipping a switch. A lead calibration standard will be used in this demonstration. If the cadmium and chromium data from the LPA correlates well with the laboratory data, future users will need to develop calibration standards for the other metals of interest.

The Niton LPA has an 8-hour Nickel Metal Hydride battery for field use, and uses a 110v AC battery charger with 12v DC adapter. The Niton LPA is Windows compatible and information from the instrument can be downloaded to a PC from the RS-232 downloading port located on the LPA.

2.3 Measurements and Observations

Six test points on the walls and ceilings will be analyzed and labeled at the IET facility with the Niton LPA. To analyze chromium, the samples need to be crushed and placed in a small cup in order to get a reading with the LPA. Baseline paint chip samples will be removed from the same areas and sent to an approved contracted lab for total metals with a Contract Laboratory Program (CLP) target analyte list analyses. (**Note:** Baseline samples from INTEC and TRA facility have already been taken, so in these locations the Niton LPA will be demonstrated to compare against the baseline analyses.) Fourteen test points will be analyzed and labeled at TRA. Two test points will be analyzed and labeled at INTEC.

The test assessment team will take other measurements as part of the evaluation. These tests include time studies, physical measurements, and visual inspections. Temperature, barometric pressure, weather conditions, etc. will be collected as physical data. The test assessment team will compile photographs and videotape of the demonstration.

3.0 Demonstration Schedule and Resource Requirements

The LPA instrument will be transported by the vendor to the IET facility at the INEEL and surveyed at the guardhouse prior to entering the INEEL grounds. During the survey, the contractor personnel will verify that training requirements for use of the LPA have been met.

The activities for the demonstration include:

- setting up equipment in demonstration area,
- collecting data,
- completing three sample runs at each area sampled during the baseline test,
- collecting still photos and video tape, and
- surveying the IET facility area.

4.0 Equipment Decontamination and Demobilization

The equipment will be surveyed as it enters and prior to leaving each facility. In the event that any portion of the LPA is contaminated with radionuclides, a complete decontamination of the equipment will be performed prior its release.

5.0 Disposition of Demonstration Derived Wastes

The LPA will not generate any waste. The only waste generated by the demonstration will be the Personal Protection Equipment (PPE) which will be disposed of by each facility as part of their routine waste streams.

6.0 Data Collection Requirements

A test engineer and a data collector will maintain detailed field notes regarding the field implementation and execution of this demonstration. Additional information will be collected on total survey times and environmental conditions prior to, during, and following the execution of the project. These field notes will be collected in hardbound logbooks.

6.1 Data Collected During Baseline Operation

The data collector and the test engineer will record the following information during the baseline portion of this demonstration:

- Number of people required to complete the job
- Time required to complete sampling activity
- PPE requirement
- INEEL contracted laboratory costs
- Turn-around time of sample results from the lab

6.2 Data Collected During LPA Demonstration

The data collector and the test engineer will record the following information during the Niton LPA demonstration:

- Number of people required to complete the job
- Time required to complete sampling activity
- PPE requirement
- Video shots, still photo shots, and any significant observations before, during, and after the D&D activity at the test area
- Activities time logged

7.0 Training Requirements

The training requirements for the demonstration are listed below in Table 2. Vendors are to provide proof of training to the test engineer prior to demonstration.

Table 2. Personnel Training Requirements

Company	Individual	Requirements
INEEL	HP, RCT, and IH	RAD Worker II, 40 Hour HAZWOPER, Respirator, Asbestos Awareness, and Confined Space
	Test Engineer and Data Collector	RAD Worker II, 40 Hour HAZWOPER, Respirator, Asbestos Awareness, and Confined Space
	IET Support Personnel	RAD Worker II, 40 Hour HAZWOPER, Respirator, Asbestos Awareness, and Confined Space
Niton Corporation	Personnel required to enter the test area	Site Access
Observers		Site Access

8.0 Costs

Currently, the vendor provides the service of the LPA. The cost of transporting, training of personnel, and any preparation work (including construction of barrier walls) will be recorded in the logbook.

Cost data will be initially recorded by means of a continuous time log. The Standard Cost Data Collections forms will subsequently be completed from that data. The vendor was required to provide specific information about the cost to purchase/lease, operate, or use the services of their equipment. Those forms were part of the contract with the vendor and will be used in the subsequent cost estimates for the Innovative Technology Summary Report (ITSR).

9.0 Health and Safety

All personnel will be briefed on general safety procedures specific to conducting the LPA Demonstration. The test engineer will obtain permits (safe work permit, radiological work permit, etc.) from the safety personnel at the IET facility. Pre-job briefings will be conducted on a daily basis during the execution of the demonstration. Hazards associated with the test area will be explained during the pre-job briefings and appropriate PPE will be discussed.

The test engineer will ensure that any personnel entering the test area have the proper training and have participated in pre-job briefings prior to entering the area. Likewise, he/she will conduct post entry debriefings to collect observation concerns and opinions of entry personnel.